

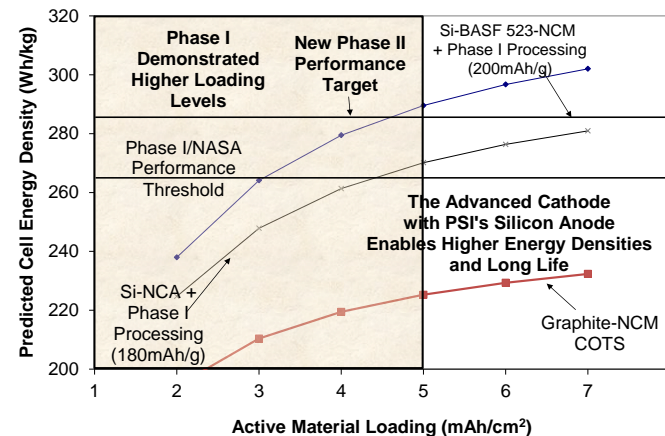
## H8.02-9280 - Long Life, High Energy Cell Development

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**Physical Sciences Inc. – Andover, MA**

### Identification and Significance of Innovation:

Physical Sciences Inc. (PSI) has combined high voltage operation of commercial cathode materials with its existing silicon composite anode material to build high performance, secondary lithium ion cells offering a 25% increase in energy density over equivalent COTS systems. Phase I data shows a 30% improvement in the critical fade rate. A novel cathode was formed with increased energy density that can be applied to increase the performance of all current and future cathode materials.

Expected TRL Range at the end of Contract (1-9): 4



### Technical Objectives:

- Prepare coated cathode electrodes that deliver >98% of the capacity of the uncoated electrodes on C/2 discharge.
- Demonstrate cathode capacities of >180mAh/g-electrode and 95% capacity retention over 50 cycles.
- Construct Si/cathode cells at loadings that will enable energy densities of  $\geq 265$ Wh/kg and demonstrate 90% capacity retention over 125 cycles.
- Produce 1.5Ah cells demonstrating cathode capacities of >180mAh/g-electrode and anode capacity of >1000mAh/g-Si composite material.

Work Plan: Cathode Electrode Preparation and Characterization, Coating Development, Application and Refinement, Lab Cell Construction and Testing, Ah Cell Construction and Cell Modeling, Management and Reporting

### NASA and Non-NASA Applications:

The proposed cathode technology could be utilized in all commercial, DOD and NASA battery applications. and cycle life.

The Si-NCM technology could be used in any mission or application that requires low mass, low volume, safe batteries. Applications include EVA suits, landers, rovers, habitats, vehicle power, and power for payloads.

The initial non-NASA application is military aerospace applications where space is limited and battery energy density and cycle life is critical.

### Firm Contacts

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**NON-PROPRIETARY DATA**